

## 1. Smart Wiper Control Using CPX Toggle Switch

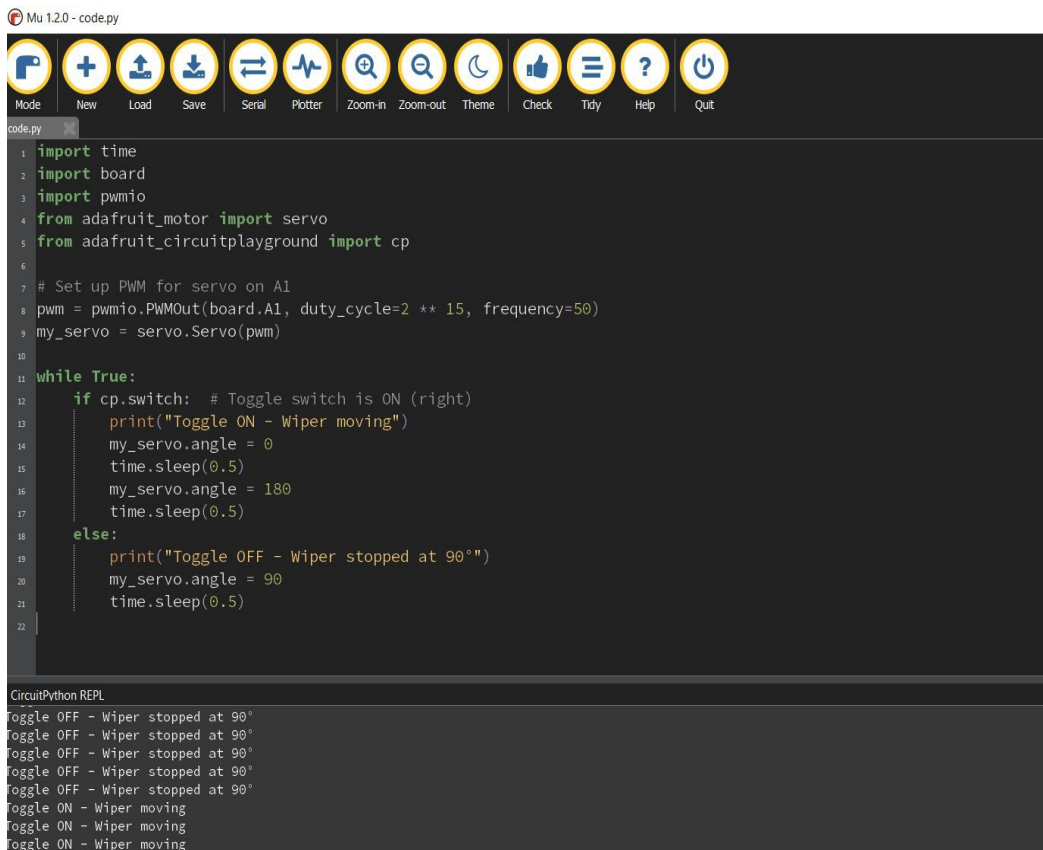
### Step 1: Connect the CPX and Servo Motor

- Connect the servo motor's signal wire to pin A1 on the CPX.
- Connect the servo's power (VCC) to VOUT, and GND to GND on the CPX.
- Plug the CPX into your computer via USB.
- Open the Mu Editor to write your Python code.

### Step 2: Understand the Toggle Switch

- The CPX has a built-in slide switch.
- In CircuitPython, you can detect its position using 'cp.switch'.
- If the switch is ON (slid to the right), it returns True.
- If it's OFF (slid to the left), it returns False.

### Step 3: Write the Code



The screenshot shows the Mu Editor interface with a toolbar at the top containing icons for Mode, New, Load, Save, Serial, Plotter, Zoom-in, Zoom-out, Theme, Check, Tidy, Help, and Quit. The main code editor displays the following Python code:

```
1 import time
2 import board
3 import pwmio
4 from adafruit_motor import servo
5 from adafruit_circuitplayground import cp
6
7 # Set up PWM for servo on A1
8 pwm = pwmio.PWMOut(board.A1, duty_cycle=2 ** 15, frequency=50)
9 my_servo = servo.Servo(pwm)
10
11 while True:
12     if cp.switch: # Toggle switch is ON (right)
13         print("Toggle ON - Wiper moving")
14         my_servo.angle = 0
15         time.sleep(0.5)
16         my_servo.angle = 180
17         time.sleep(0.5)
18     else:
19         print("Toggle OFF - Wiper stopped at 90°")
20         my_servo.angle = 90
21         time.sleep(0.5)
22
```

Below the code editor is the CircuitPython REPL window, which shows the following output:

```
Toggle OFF - Wiper stopped at 90°
Toggle OFF - Wiper stopped at 90°
Toggle OFF - Wiper stopped at 90°
Toggle OFF - Wiper stopped at 90°
Toggle OFF - Wiper stopped at 90°
Toggle ON - Wiper moving
Toggle ON - Wiper moving
Toggle ON - Wiper moving
```

## Code Explanation

```
import time
```

Allows the use of time delays (`time.sleep()`).

```
import board
```

Gives access to physical pins on CPX (like `board.A1`).

```
import pwmio
```

Creates PWM signals needed to run the servo motor.

```
from adafruit_motor import servo
```

Imports the **Servo** class to control servo angles easily.

```
from adafruit_circuitplayground import cp
```

Gives access to CPX's built-in switch, LEDs, sensors, etc.

```
pwm = pwmio.PWMOut(board.A1, duty_cycle=2 ** 15, frequency=50)
```

Starts a PWM signal on **pin A1**. The 50 Hz frequency is standard for servos.

```
my_servo = servo.Servo(pwm)
```

Creates a servo object named **my\_servo** to send angle commands.

```
while True:
```

Runs forever — keeps checking the switch and moving the servo.

```
if cp.switch:
```

Checks if the toggle switch is ON (True).

```
print("Toggle ON - Wiper moving")
```

Shows that the servo is active.

```
my_servo.angle = 0
```

Moves the servo to **0°**, start position.

```
time.sleep(0.5)
```

Waits half a second before the next move.

```
my_servo.angle = 180
```

Moves the servo to **180°**, end position.

```
time.sleep(0.5)
```

Waits half a second before repeating the sweep.

Else:

If the switch is OFF (False).

```
print("Toggle OFF - Wiper stopped at 90°")
```

Shows the servo is stopped.

```
my_servo.angle = 90
```

Moves the servo to **90°**, center resting point.

```
time.sleep(0.5)
```

Waits briefly before checking again.

#### **Step 4: Learning Outcome**

- Students will understand how to control a servo motor using the CPX toggle switch.
- Learn how to read digital input using `cp.switch`.
- Use `servo.angle` to create motion depending on switch position.
- Build simple interactive hardware logic with CircuitPython.